

Notice of Allowability

Application No.

09/499,037

Examiner

Johannes P Mondt

Applicant(s)

AIHARA ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 09/22/2003.
2. ☒ The allowed claim(s) is/are 1-16.
3. ☒ The drawings filed on 07 February 2000 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1 <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6 <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No. <u>12/23/03</u> . |
| 3 <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No. _____ | 7 <input type="checkbox"/> Examiner's Amendment/Comment |
| 4 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9 <input type="checkbox"/> Other |

DETAILED ACTION

Response to Amendment

Request for Reconsideration filed 09/22/2003 forms the basis of this official action.

Allowable Subject Matter

1. **Claims 1-16** are allowed. The following is an examiner's statement of reasons for allowance, with reference to two distinct group of claims:

1. *Claims 3-6, 14 and 16* are allowed. The following is a statement of reasons for the indication of allowable subject matter: the invention by Kang (6,211,005 B1) has a strontium bismuth tantalum oxide layer included in the capacitor dielectric film that otherwise satisfies the limitations of claim 3, and hence also that part of the limitations of claims 4 and 5 that are identical with claim 3. However, it is not obvious to replace said strontium bismuth tantalum oxide with tantalum oxide, because ferroelectric materials such as strontium bismuth tantalum oxide have the advantage over tantalum oxide (including Ta₂O₅) as dielectric material in a capacitor for a DRAM of having a higher dielectric constant. Claim 6 depends on claim 5 and also was disclosed. Claim 14 depends on claim 3 and is disclosed.

Other art of interest such as Summerfeldt et al (5,612,574) (Form PTO-892) does not teach direct contact between tantalum nitride layer 22 (cf. col. 4, line 5) and tungsten film 20 (cf. col. 3, line 45) because of an intervening adhesion layer 26 made of "titanium, tantalum, ruthenium or other suitable material", nor do Summerfeldt et al

teach that the cell plate electrode can also be made of indium oxide. The latter omission to teach indium oxide for the cell plate electrode means that claim 16 is allowable.

2. *Claims 1, 2, 7-13 and 15* are allowed. The following is an examiner's statement of reasons for allowance: within the context of claims 1, 2 and 15 (and claims dependent thereon) the tantalum films found in the prior art, particularly: Choi et al (6,168,991 B1) do not necessarily have a work function greater than 4.95 eV. In this regard the argument put forward by Applicant that a work function of said tantalum nitride films greater than 4.95 eV is not inherent is accepted based at least on the article "Optimum Electrode Materials for Ta₂O₅ Capacitors for High- and Low- Temperature Processes", Matsushashi H. et al, Jpn. J. Appl. Phys., Volume 53, pp. 1293-1297 (1994).

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is: 703-306-0531 BEFORE February 4, 2004; and 571-272-1919 AFTER February 4, 2004. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601 BEFORE February 4,

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2004, and on 571-272-1915 AFTER February 4, 2004. The fax phone number for the organization where this application or proceeding is assigned is 703-308-5399.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

December 23, 2003

JPM